

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
*SOUTH DAKOTA SUPPLEMENTS ITALICIZED***

CONTOUR BUFFER STRIPS

(ac.)
CODE 332

DEFINITION

Narrow strips of permanent vegetative cover established across the slope and alternated down the slope with wider cropped strips.

PURPOSES

To reduce sheet and rill erosion.

To reduce transport of sediment and other waterborne contaminants downslope, onsite or offsite.

To enhance upland wildlife habitat.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on sloping cropland to reduce sheet and rill erosion and sediment yield and on all cropland to enhance wildlife habitat.

It is most suitable on uniform slopes ranging from four to eight percent with slope lengths < the Critical Slope Length (Critical Slope Length = length of slope above which the practice loses its effectiveness), in regions where rainfall intensities are low to moderate (10 year EI < 140), EI = storm energy* intensity.

This practice is not suited to fields with extremely long slopes whose length exceeds the critical slope length for contouring by more than one and one-half times, unless the field slope length is shortened by the installation of other practices (e.g. terraces).

The practice is impractical to unsuitable on undulating to rolling topography because of the difficulty of maintaining parallel strip boundaries across the hill slope or staying within row grade limits.

The narrow strips of permanent vegetative cover are not a part of the normal crop rotation.

This standard does not apply to situations where the width of the buffer strips will be equal to or exceed the width of the adjoining crop strips.

CRITERIA

General Criteria Applicable to All Purposes

Plant species must be selected according to the type and quantity of pollutant contained in the runoff and to the growth condition during the time of the year that the pollutant can be expected to move as overland flow. (An example of proper species selection would be to select atrazine tolerant species if atrazine is applied to the contributing watershed.)

Plant species should be selected that have stiff, upright growth characteristics for flow retardance and pollutant filtering. Plants must remain upright during flow events.

Criteria for establishment (plant suitability, seedbed preparation, seeding depth, weed control, etc.) of vegetation will be consistent with South Dakota standard 512 (Pasture and Hayland Planting). The species composition (minimum of two species) and seeding rates will be selected from Table 1, page 5, of this standard.

The selected plant species must be compatible with other objectives of the landuser.

No plants listed on the noxious weed list of the state will be established in a buffer strip cropping system.

Additional Criteria To Reduce Sheet and Rill Erosion

a. Row Grade, Strip Boundaries, and Baselines

The grade of the cropped strip shall be aligned as closely as possible to the

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contour to achieve the greatest erosion reduction possible. The maximum in-row grade of the crop strips shall not exceed the lesser of one-half of the up and down hill field slope or two percent.

For crops sensitive to ponded water for periods less than 48 hours, design a positive row grade of not less than one-half percent from the nose of a hill or ridge toward a stable outlet.

Up to 3 percent row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet.

The grade along the up slope side of the vegetative buffer shall be the same as for the cropped strip directly above it.

When the grade of any crop strip reaches the maximum allowable design grade, a new base line shall be established up or down slope from the last buffer strip and used for the layout of the next crop strip.

b. Stable Outlets

Surface flow from contoured crop rows must go to a stable outlet. Stable outlets include grassed waterways, underground outlets for terraces or diversions, water and sediment control basins, field borders, headlands, or end rows, or similarly stabilized areas.

c. Arrangement of Strips

Cropped strips shall be alternated with buffer strips down the hill slope. Normally a crop strip will occupy the area at the top of the hill.

When used in combination with terraces, the layout of buffer strips shall be coordinated with the grade and spacing of the terraces so that strip boundaries will parallel terraces wherever possible. The terrace channel shall occupy the buffer strip location or lie immediately below the last buffer strip.

d. Width of Strips

The buffer strips shall be of equal width except when a varying width buffer strip is needed to keep either a cropped strip adjacent to it of uniform width or to maintain the strip boundary grades within

the criteria set above. Width of buffer strips at their narrowest point shall be no less than 15 feet for grasses or grass legume mixtures.

Cropped strip widths shall be of uniform width between buffer strips and not exceed 50 percent of either the slope length (L), used for erosion calculation, or the critical slope length for strip cropping, whichever is least, determined by using the approved erosion prediction technology. *The width of the cropped strip may be adjusted to account for equipment width.*

e. Vegetation

Vegetation grown on buffer strips shall consist of permanent grasses, or grass-legume mixtures, adapted to the site, and tolerant of the anticipated depth of sediment deposition.

The buffer strips shall have a Vegetative Cover-Management Condition of one or two that provides protective cover and induces sediment deposition during periods when erosion is expected to occur on the cropped strips. Cropped strips will normally be expected to have a Cover-Management Condition 3 through 7. (Cover Management Conditions are described in the *South Dakota Technical Guide (SDTG), Section I, Erosion Prediction, RUSLE, Table 8, page 28.*)

The stem density for grass or grass-legume mixtures shall be greater than 50 per square foot.

f. Critical Slope Length

The critical slope length for buffer strip cropping is one and one-half times the critical slope length determined for contour farming as determined using approved erosion prediction technology.

g. Headlands or End Rows

On fields where row crops are a part of the rotation, keep headlands or end rows in permanent sod if their row grade would be steeper than the designed grade of the crop strip.

h. Level of Erosion Control

The level of erosion control achieved by the buffer strip cropping standard shall meet or exceed the soil erosion level specified by the conservation plan objective. It shall be determined using approved erosion prediction technology, accounting for the impact of other conservation practices in the system.

Additional Criteria to Reduce the Transport of Sediment and Other Water-Borne Contaminants Downslope

a. Vegetation

Buffer strips shall be established using permanent grass vegetation.

b. Width of Strips

On sloping cropland exceeding three percent, the design shall be based on the minimum criteria given above to reduce sheet and rill erosion. On slopes 3 percent or flatter, the width of the buffer strip shall be 15 feet or wider.

The maximum width between buffer strips shall be 100 feet or 1/2 of the field slope length, whichever is smaller. This width may be adjusted to account for equipment width.

c. Arrangement of strips

Buffer strips and crop strips will be alternated down the hill slope. A buffer strip *or filter strip* will be established at the bottom of the slope. This width of *the* buffer strip *at the bottom of the slope should* be two times the width of the other buffer strips in the system.

d. Headlands or End Rows

Headlands or end rows shall be vegetated and have a minimum width of 15 feet between the end of the tilled strip and the field's edge.

Additional Criteria to Enhance Wildlife Habitat

a. Vegetation

Use permanent grasses or grass-legume mixtures, adapted to the site. *When buffer strips are designed to enhance wildlife habitat, plant species diversity including the addition of forbs* recommended for

wildlife purposes, are to be used where adapted.

b. Strip Width

On sloping cropland exceeding 3 percent, the design will be based on the minimum criteria given above to reduce sheet and rill erosion and will have a minimum strip width of 30 feet. On slopes 3 percent or flatter, the width of the contour buffer strip shall be 30 feet or wider as determined based on the requirements for nesting and escape cover of the target wildlife species.

The maximum width between buffer strips shall not exceed 300 feet.

CONSIDERATIONS

Protect areas of existing or potential concentrated flow erosion by any one or more suitable conservation practices, such as grassed waterways, water and sediment control basins, or diversion terraces.

Design and install the strip layout to best facilitate operation of all machinery used on the strips. Whenever possible, lay out strips to have some multiple of full implement widths used for the farming operation.

Prior to design and layout, consider removing any obstructions or making changes in field boundaries or shape, where feasible, to improve the effectiveness of the practice and the ease of performing farming operations.

Prior to layout, inspect the field's position on the landscape to find key points for commencing layout or getting the width of one set of strips (one cultivated and one buffer) to pass by an obstruction or ridge saddle. Whenever possible to stay within grade limits, run strip boundary parallel with fence lines or other barriers. Account for uncropped access road widths when they must traverse the field by adjusting strip boundaries on either side accordingly.

When the slope length exceeds the critical slope length for the Cover-Management Condition that best characterizes the field to be contour buffer stripped, establish structures such as terraces to reduce the slope length below critical if the soil loss objective is not reached.

Critical slope lengths can be increased by retaining crop residue on the soil surface of the cultivated

strips using crop residue management practices. Certain tillage practices can also be used on the cultivated strips to increase random roughness to cause deposition to occur in depressions between soil clods. However, if the cropped strips are kept very rough, in high ridges, or under heavy residue cover, the need for contour buffer strips as an erosion and sediment reduction practice will be reduced since less sediment will be delivered to them.

To enhance wildlife habitat, mow the buffer strips every other year or every third year depending upon geographical location. The residual cover provides early and late season nesting and escape cover for many species of wildlife displaced from other mowed areas.

Some weedy growth may be allowed in the strips as they provide an insect source for young birds. Also, consider adding native forbs to the seeding mixture when they are available.

PLANS AND SPECIFICATIONS

Specifications for establishment and maintenance of this practice shall be prepared for each field or treatment unit according to the Criteria, Considerations, and Operation and Maintenance described in this standard.

Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Conduct all farming operations parallel to the strip boundaries except on headlands or end rows with gradients less than the criteria set forth in this standard.

Time mowing of buffer strips to maintain appropriate vegetative density and height for optimum trapping of sediment from the upslope cropped strip during the critical erosion period(s). Delay mowing until after ground nesting birds have hatched.

Fertilize buffer strips as needed to maintain stand density.

Where contour row curvature becomes too sharp to keep equipment aligned with rows during field operations, establish sod turn strips on sharp ridge points. In drainageways, establish grassed waterways at least to the point of sharp curvature. These strips shall be wide enough to allow the equipment to be lifted and/or turned and meet the same rows across the turn strip.

Mow sod turn strips and waterways at least annually.

Spot seed or totally renovate buffer strip systems damaged by herbicide application after residual action of the herbicide is complete.

Redistribute sediment accumulations along the upslope edge of the buffer-crop strip interface upslope over the cultivated strip when needed to maintain uniform sheet flow along the buffer/cropped strip boundary. If sediment accumulates just below the upslope edge of the buffer strip to a depth of 6 inches or vegetative ground cover falls below 65 percent in the buffer strip, relocate the buffer/cropped strip interface location. Cultivated strips and buffer strips shall be rotated so that a mature stand of protective cover is achieved in a newly established buffer strip immediately below or above the old buffer strip before removing the old buffer to plant an erosion-prone crop. Alternate repositioning of buffer strips to maintain their relative position on the hill slope.

Renovate vegetated headlands or end row area as needed to keep ground cover above 65 percent. Renovation shall only include the immediate seedbed preparation and reseedling to a sod-forming crop with or without a nurse crop. Maintain full headland or end row width to allow farm implements room to double back on the same strip.

REFERENCES

Predicting Soil Erosion by Water: A Guide to Conservation Planning With the Revised Universal Soil Loss equation (RUSLE), Agricultural Handbook Number 703

TABLE 1
SEEDING COMPOSITION AND RATES ^{1/}
All Technical Guide Areas

	<i>PLS lbs per acre for a full seeding</i>	<i>Number of seeds per PLS Pound</i>
<i>Native Grasses</i>		
<i>Big bluestem</i>	7.9	165,000
<i>Indiangrass</i>	7.5	175,000
<i>Reed canarygrass</i>	2.4	540,000
<i>Sand bluestem</i>	13.1	100,000
<i>Switchgrass</i>	3.4	389,000
<i>Western wheatgrass</i>	11.9	110,000
<i>Native Legumes</i>		
<i>Illinois Bundleflower</i>	21.8	60,000
<i>Purple prairieclover</i>	4.5	290,000
<i>White prairieclover</i>	3.4	384,000
<i>Canada milkvetch</i>	4.9	266,000
<i>Introduced Grasses</i>		
<i>Creeping foxtail</i>	1.5	900,000
<i>Intermediate wheatgrass</i>	14.9	88,000
<i>Pubescent wheatgrass</i>	13.1	100,000
<i>Tall wheatgrass</i>	16.5	79,000
<i>Introduced Legumes</i>		
<i>Alfalfa</i>	6.2	210,000
<i>Alsike clover</i>	1.9	680,000
<i>Birdsfoot Trefoil</i>	3.1	418,000
<i>Cicer milkvetch</i>	9.0	145,000
<i>Sainfoin</i>	43.6	30,000

^{1/}The composition of a seeding will be at a minimum of two grass species with the exception of Reed canarygrass or Creeping foxtail which may be seeded as a single species.

The minimum amount of a species in any mix is 10 percent.

Legumes will not occupy more than 10 percent in any mix.